

**Progress Report on Funded Nursery Projects
Washington State Department of Agriculture**

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Project Title: Evaluation of New Apple Dwarf and Semi-dwarf Rootstocks

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Progress: To be submitted for all projects funded in FY05 (July 1, 2004, to June 30, 2005): and FY06 (July 1, 2005, to June 30, 2006).

Performance data from 3 apple rootstock trials are presented as follows:

1999 Fuji Dwarf Rootstock Trial (Tables 1 and 2). Tree size, measured as trunk cross-sectional area (TCA), was smallest for M.9 T337, and the tree sizes of Supporter 2, Supporter 1, M.26 EMLA, and Supporter 3 were not significantly larger than M.9 T337. Rootstocks significantly larger than M.9 in order of increasing tree size were the Cornell-Geneva (CG) rootstocks 4013, 5179, 16T, 16N, and 5935.

In 2004 yield was generally high with yield efficiency (kg/cm²) highest for Supporter 1, M.26, CG.5179, and G.16T. On a cumulative basis, yield (kg/tree for '01 to '04) was highest for CG.16N and G.16T (the same rootstock with different propagation techniques). Cumulative yield efficiency (kg/cm²) was highest for two very dwarfing rootstocks, Supporter 1 and Supporter 2. M.26 also had high cumulative yield efficiency but the standard dwarfing rootstock M.9 T337 had the lowest yield efficiency of all the rootstocks. The two rootstocks with the highest cumulative yield, C.16N and G.16T, also had the highest yield efficiency.

Differences in fruit size between rootstocks were not significant in 2002 and 2004. Rootstocks with high rankings for large fruit size in both years were CG.16N and CG.5179. Most rootstocks had few root suckers. The largest number of root suckers occurred with CG.5179 and G.16T.

Through year 6, M.9 T337, the dwarfing standard, has performed poorly (for no obvious reason) but the more vigorous dwarfing rootstock M.26 EMLA has performed well. Of the semi-dwarfing CG rootstocks, 16N and 16T have performed well.

2001 Golden Delicious Dwarf and Semi-Dwarf Rootstock Trials (Tables 3 and 4). In the fourth year of the dwarf trial, tree size (TCA) of four rootstocks, G.11, M.26, CG.5012, and CG.4814, was not significantly different from the standard dwarfing rootstock M.9. Trees on two rootstocks, CG.5890 and CG.4011, were significantly larger than trees on M.9.

Yield (kg/tree) and yield efficiency (kg/cm²) in 2004 were low for all rootstocks in the trial. There was no significant difference among the rootstocks in cumulative yield or cumulative yield efficiency. One rootstock, CG.4814, had a relatively large number of root suckers.

In the semi-dwarf trial, none of the rootstocks had tree size significantly different from the semi-dwarf standard rootstock M.7. Because of the poor yield in 2004, it was not possible to compare the semi-dwarf rootstocks for yield or yield efficiency.

Summary. These rootstock trials are generally too young to draw meaningful conclusions. However, CG.16N and G.16T (variations of the same rootstock) appear to be promising and worthy of trial by Washington growers.

Table 1. Tree size (TCA) yield and yield efficiency at the end of 2004 (year 6) for the Cornell-Geneva Fuji dwarf rootstock trial planted in 1999 at WSU-TFREC, Wenatchee (Columbia View).

Rootstock	2004 TCA (cm ²)	Yield (kg/tree)			Yield efficiency (kg/cm ²)		
		2002	2003	2004	2002	2003	2004
CG.5935	41.2	12.3	2.4	23.3	0.78	0.07	0.74
CG.16N	31.1	12.3	3.1	24.8	0.67	0.15	0.78
G.16T	30.5	14.0	6.2	26.3	0.60	0.34	1.02
CG.5179	27.1	12.7	0.0	25.9	0.98	0.00	1.09
CG.4013	26.9	6.5	2.5	17.0	0.42	0.13	0.69
Supp. 3	20.8	7.9	6.2	11.0	0.68	0.44	0.53
M.26 EMLA	17.4	6.9	2.0	14.5	0.60	0.20	1.21
Supp. 1	17.1	7.7	3.2	21.7	0.69	0.24	1.45
Supp. 2	16.7	9.0	2.4	15.9	0.90	0.23	1.00
M.9 T337	15.9	6.4	4.0	6.4	0.84	0.33	0.28
LSD=.05	9.5	5.1	5.5	18.7	0.50	0.37	1.07

Table 2. Cumulative yield and yield efficiency, number of suckers and mean fruit weight at the end of 2004 (year 6) for the Cornell-Geneva Fuji dwarf rootstock trial planted in 1999 at WSU-TFREC, Wenatchee (Columbia View).

Rootstock	Mean fruit wt (g)		Total suckers '01-'04	Cumulative yield (kg/tree)		Cumulative yield efficiency (kg/cm ²)	
	2002	2004		'01-'03	'01-'04	'01-'03	'01-'04
CG.5935	244	270	2.0	14.7	38.0	0.61	1.14
CG.16N	251	287	0.4	24.5	49.3	1.06	1.56
G.16T	250	273	5.0	23.1	49.4	1.21	1.84
CG.5179	254	279	6.8	14.3	40.2	0.73	1.72
CG.4013	240	281	3.7	13.2	30.1	0.70	1.22
Supp. 3	250	284	3.8	20.6	31.6	1.42	1.52
M.26 EMLA	251	266	3.5	10.0	27.3	0.80	1.88
Supp. 1	238	262	3.3	15.9	37.6	1.25	2.41
Supp. 2	244	265	2.5	13.7	27.0	1.23	1.91
M.9 T337	268	253	1.8	12.3	18.7	1.16	0.90
LSD=.05	NS	NS	--	8.3	18.1	0.59	1.22

Table 3. Yield and tree characteristics for rootstocks in the Cornell-Geneva dwarf rootstock trial with Golden Delicious planted in 2001 at WSU-TFREC, Wenatchee, WA.

Rootstock	2004 TCA (cm ²)	Yield		Yield efficiency		Total suckers '03-'04	'02-'04 Cumulative yield (kg/tree)	'02-'04 Efficiency (kg/cm ²)
		2003 (kg/tree)	2004 (kg/tree)	2003 (kg/cm ²)	2004 (kg/cm ²)			
CG.5890	15.2	3.3	1.5	0.22	0.09	4.8	4.7	0.26
CG.4011	13.5	5.5	0.5	1.02	0.03	3.4	6.1	0.38
CG.4814	10.5	2.8	0.8	0.22	0.06	9.7	3.6	0.31
CG.5012	9.9	2.2	0.2	0.24	0.02	1.0	2.4	0.22
M.26	8.1	2.2	0.3	0.26	0.04	2.5	2.4	0.43
M.9	6.3	3.5	0.1	0.45	0.01	0.7	3.7	0.44
G.11	6.0	1.4	0.8	0.20	0.12	2.0	1.8	0.26
LSD	5.7	4.3	1.1	0.47	0.10	--	4.9	0.42
P=0.05								

Table 4. Yield and tree characteristics for rootstocks in the Cornell-Geneva semi-dwarf rootstock trial with Golden Delicious planted in 2001 at WSU-TFREC, Wenatchee, WA.

Rootstock	2004 TCA (cm ²)	2004 Yield (kg/tree)	2004 Yield efficiency	Total suckers '03-'04	'01-'04 Cumulative yield (kg/tree)	'01-'04 Yield efficiency
6589	23.1	0.0	0.00	1.0	0.0	0.00
6006	14.4	1.1	0.11	2.5	1.1	0.11
M.7	11.3	0.5	0.03	7.9	0.5	0.27
6143	10.9	0.8	0.07	5.5	0.8	0.07
6874	9.9	2.4	0.37	3.7	2.4	0.37
LSD P=0.05	12.1	2.1	0.42	--	--	0.42